Low proportion of shrews in the diet of small mustelids in western Finland

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Abstract

Scats and guts of stoat and least weasel collected after a decline of microtines in western Finland showed that these mustelids did not use shrews as their alternative prey, probably because of their distaste for shrews. Therefore it seems that small mustelids did not cause the synchronous decline phases in microtine and shrew populations observed in the transition zone of Fennoscandian microtine cycles. In this zone the most likely reason, especially for spring and summer declines, may be the predation by avian predators which frequently feed on shrews in addition to microtines.

Introduction

Based on the density variations of small rodents, Fennoscandia can be divided into three regions: 1. a southern zone (from 55> to about 59 >N) with quite stable vole populations, 2. a transition zone (about 59>–61 >N) and 3. a zone north of 61 >N characterized by pronounced fluctuations in microtine populations (Hansson and Henttonen 1985). According to Korpimäki (1986a, b) the transition zone extends from the southern coast of Finland to 63 >N in the western part of the country.

In the northern zone, shrews have a low phase synchronously with cyclic microtines (Hansson 1984; Henttonen 1985), but both small mammal groups are non-cyclic in the southern zone (Hansson 1984). In the transition zone, microtines and shrews have synchronous decline phases, although the other phases are not regularly synchronous (Korpimäki 1986a). The above authors suggested that the synchrony could be best explained by predation. According to Henttonen (1985), the most probable group of predators contributing the synchronous lows in the northern zone is small mustelids, especially the least weasel *Mustela nivalis*. In the present paper, we will study, whether this suggestion is true in the transition zone.

If small mustelids cause synchronous lows in microtine and shrew populations, they should use shrews as their alternative prey when microtines decrease. Therefore we collected data on the food of the stoat *Mustela erminea* and least weasel in southern Ostrobothnia, western Finland, after a severe decrease of vole populations.

Material and methods

In the large field plain of Alajoki (63>05′N, 22>55′E), 2 guts and 172 scats of the stoat (a total of 201 prey items) and 3 guts and 30 scats of the least weasel (33 prey items) were sampled between autumn 1983 and spring 1985. A majority of samples was collected in winters 1983–1984 and 1984–85 during snow-tracking. Teeths, bone fragments, and hair and feather remains were used for the identification of vertebrate prey. To find remains of all prey items in each scat, smallest scats were totally used for identification and from greater scats hair and feather remains were taken from several parts of the scat. Remains of more than one vertebrate prey could be found in 1 gut and 27 scats (16.3 %) of the stoat, but each gut and scat of the least weasel included only one vertebrate prey. Since only a low

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proportion of the food samples of the stoat contained more than one prey item, correction factors (ERLINGE 1981) were not used. Scale patterns, cross-sections and medulla types were examined from hair remains, and their idenfication was made according to DAY (1966) and DEBROT et al. (1982). Hairs collected from small mammals trapped in the study area were also used as reference material. Feather remains were identified according to DAY (1966).

Small mammals at Alajoki were snap-trapped between 1977 and 1985. Captures were performed in May and early June (spring catches) and late August and early September (autumn catches), at four sample quadrats (in a cultivated field, an abandoned field, a pine forest and a spruce forest) each year (a total of 13 404 trap nights). At each quadrat, 50–60 Finnish galvanized metal snap-traps were set in small mammal runs at distances of 10 m apart for four days (sometimes only three days) and were checked once a day (see KORPIMÄKI 1984, 1985; NORRDAHL 1985 for further details). Although these traps are relatively efficient, they are too robust for smaller species of shrews (HENTTONEN 1985; KORPIMÄKI 1986a), and the trappability of harvest mouse *Micromys minutus* with them is also low (KOSKELA and VIRO 1976). Therefore pitfall traps made by deep buckets were also used in 1984–1985. According to our observations, they are more efficient than snap-traps for collecting both shrews (see also e.g. AULAK 1967; PANKAKOSKI 1979), harvest mice (KOSKELA and VIRO 1976) and microtines.

Results

After a peak in winter 1982–1983, both *Microtus* vole (*M. agrestis* and *M. epiroticus*) and bank vole (*Clethrionomys glareolus*) populations were low in autumns 1983 and 1984; shrews were clearly more abundant than these voles (Table 1). Based on pitfall trappings, harvest mice were more frequent than voles but less frequent than shrews in autumn 1984.

Table 1

Density indices for small mammals in autumn trappings at Alajoki in 1983–84
(Trapped ind./100 trap nights)

	Snap traps 1983	Snap traps 1984	Pitfall traps 1984
Microtus spp.	0.0	0.5	2.5
Bank vole	0.5	1.1	2.1
Harvest mouse	0.0	0.2	8.3
Shrews	3.3	2.0	16.3
No. of trap nights	400	440	240

The most important prey of the stoat was harvest mouse, followed by *Microtus* spp. and water vole *Arvicola terrestris* (Table 2). Stoats frequently took also passerines, muskrats *(Ondatra zibethica),* house mice *(Mus musculus),* and Norway rats *(Rattus norvegicus)* but only exceptionally shrews (one individual, 0.5 %), although these were the most abundant group of small mammals in the field (Table 1). The most common prey items of the least weasel were *Microtus* voles and harvest mouse but shrews were not at all recorded in its diet.

Discussion

Stoats and weasels seemed to catch both murids and microtines in the similar relation as their availability indicated, but they evidently avoided to feed on shrews. The most probable reason is the well-known distaste of both mustelids for shrews (see e.g. KING 1980; ERLINGE 1981 with references). This result gives circumstantial evidence for the suggestion by KORPIMÄKI (1986a) that these small mustelids should not cause the decrease of shrew populations in the transition zone. Birds of prey, which frequently feed on shrews in addition to microtines (see KORPIMÄKI 1986a: Table 1) may play a more important role in simultaneous declines of microtines and shrews in this zone, especially in spring and summer, although we cannot completely exclude the effects of other extrinsic factors in this case (see KORPIMÄKI 1986a).

The above suggestion must be treated with caution, however, since there are at least

Table 2

Diet composition of the stoat and least weasel at Alajoki between autumn 1983 and spring 1985 as indicated by scat and gut analyses

(The figures show the proportions of various prey categories as percentages by number)

Prey categories	Stoat	Weasel
Microtus spp.	16	71
Bank vole	3	–
Water vole	14	–
Muskrat	4	–
Norway rat	4	–
House mouse	4	–
Harvest mouse	43	14
Sciurids	1	–
Lagomorphs	1	–
Shrews	1	–
Passerines	7	–
Others (insects, plants etc.)	2	15
No. of prey items	201	33

three factors that may confuse the results. 1. The number of food samples in the present case is still relatively low. 2. According to observations during snow-tracking (Korpimäki and Norrdahl unpubl.), stoats can sometimes kill shrews in winter, but they do not feed on them, probably because of distaste. The similar response has been reported also for the weasel (Rubina 1960). Therefore gut and scat analyses do not necessarily reflect exact effects of small mustelids on prey populations. 3. The food data on weasels concerns mainly males, since females only rarely hunt above the snow surface in winter (Korpimäki and Norrdahl unpubl.). According to Erlinge (1975), some aberrant weasel females kept in captivity readily fed on shrews, although they usually showed distaste for shrews.

We are well aware that the low proportion of shrews observed in the diet of small mustelids may reflect only the situation in the transition zone, where the number of alternative prey other than shrews is higher than in the northern zone. Occasionally greater proportions have been also recorded in American (Hamilton 1933; Aldous and Manweiler 1942) and Russian studies (Ognev 1935; Vershinin 1972), but not in Western (Day 1968; King 1980) and Northern European studies (Erlinge 1975, 1981). Probably, small mustelids may feed on shrews only in areas where other, more preferred alternative prey groups are scarce (for example in the northern zone).

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Zusammenfassung

Geringer Anteil von Spitzmäusen in der Nahrung kleiner Musteliden aus West-Finnland

Exkremente und Mägen von Hermelin und Mauswiesel wurden in Zeiten nach einem Zusammenbruch von Wühlmaus-Populationen (Microtini) in West-Finnland gesammelt und auf Nahrungszusammensetzung untersucht. Dabei zeigte sich, daß diese kleinen Musteliden keine Spitzmäuse (Soricidae) als Ersatznahrung genutzt hatten, wahrscheinlich aus Abneigung vor diesen möglichen Beutetieren. Hermeline und Mauswiesel haben daher wahrscheinlich die synchrone Abnahme der

Wühlmaus- und Spitzmaus-Populationen, die in den Übergangszonen der fennoscandischen Wühlmauszyklen festgestellt worden ist, nicht verursacht. In dieser Zone sind wohl in stärkerem Maße Raubvögel verantwortlich zu machen, besonders für Frühjahrs- und Sommerzusammenbrüche. Sie fressen außer Wühlmäusen im allgemeinen auch Spitzmäuse.

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